

Claims 1-13 are in the application.

The drawings are objected to because they should be labeled "Prior Art". Drawing proposals showing the required labeling are submitted herewith together with a letter to the draftsman.

Reconsideration and withdrawal of the rejection of claims 5 and 10 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention is respectfully requested.

The examiner objects to the steel specification 22MnB5 in claim 5 and steel specification C15 in claim 10. These specifications are German industrial standards and correspond to the steel specification 15 B 24 of the U.S. standard A514 and to the steel specification A 576 of the U.S. standard ASTM. Accordingly, these specifications are well-known in the art and are therefore properly disclosed and claimed.

Reconsideration and withdrawal of the rejection of claims 1-4 and 6-8 under 35 U.S.C. 103(a) as being unpatentable over

Toepker et al. (EP 0752332 A1) in view of Wassilew et al. (EP 0 306 609) and Connelly (US 3,656,219) and Keen (US 3,934,443) is respectfully requested.

The present invention is based on the steps of:

- a) cold-forming a tube blank of tempering steel to a tubular profiled member with a torsionally yielding central longitudinal section of a U-shaped cross-section and with opposed torsion-proof end sections;
- b) annealing at least partial sections of the tubular profiled member at a temperature level between 850° C and 960°C;
- c) hardening the tubular profiled member in water at a temperature above the AC3 point;
- d) tempering the tubular profiled member at a temperature between 200° C and 550° C for a duration of more than five minutes;
- e) subjecting the tubular profiled member at least to an outer surface hardening process; and
- f) subjecting the tubular profiled member to further configuration processing steps for completing a twist beam rear axle.

The starting material for the method according to the invention is thus a tube blank of tampering steel which, in a first step, is cold-formed to have a longitudinal center section with a U-shaped cross-sectional profile. During this cold-forming step, the end sections remain unchanged, i.e., retain their circular cross-section. The thus cold-formed tubular profiled member is then subjected to certain heat treatment steps.

The examiner cites Toepker et al. to show a transverse support for a twist beam rear axle with a centrally located U-shaped cross-section formed from a tube; no processing method is disclosed.

The examiner cites Wassilew in order to show that, subsequent to the cold-forming step, annealing is carried out. This heat treatment step is carried out above the AC1 point, preferably at a temperature of 950° C, this being the upper end of the range claimed according to the present invention. Moreover, this heat treatment step is carried out for a completely different purpose than in the present invention: the purpose of heat treatment is to strengthen the microstructure and

to prevent delta ferrite formation and thus brittle fracture.

Wassilew moreover describes the cold-forming step for a tube member as being a drawing step (Example 1) so that the circular cross-section of the tube claimed is not changed. A deformation to a U-shaped profiled center section of a tube blank is not disclosed. A person skilled in the art of manufacturing a bending-resistant, torsionally yielding tubular profiled member as a twist beam rear axle would not consider the cited prior art Wassilew in order to find suggestions how to carry out a certain heat treatment process for such a twist beam. The cited prior art only discloses a special stabilization annealing above the AC1 point at approximately 950°C. Moreover, the cited prior art reference does not provide any disclosure in regard to hardening a U-shaped tubular profiled member at a temperature above the AC3 point in water.

Also, the combination of the three cited prior art references which belong to entirely different technical fields (Toekper et al. -configuration of a twist beam axle; Wassilew - stabilization annealing for preventing brittle fracture), and Connelly (hardening of a cutting tool) does not provide any

suggestion in regard to annealing the U-shaped tubular profiled member after hardening above the AC1 point at a temperature between 200°C and 550°C for a time period of > 5 minutes.

A person skilled in the art of twist beam rear axles would have no incentive to look into the field of cutting tools and their manufacture as semi-finished or finished products of a single-phase, high alloy, martensitic chromium steel and to then further apply this teaching to U-shaped tubular profiled members. The treatment steps described in Connolly relate to a very particular steel with very particular properties and composition and a very particular use of the steel. See col. 3, line 65, to col. 4, line 28. The suggested use of these steels is in the field of impact tools such as chisels, punches etc.

Furthermore, a person skilled in the art would not consider a tool for processing the inner surface of a bore according to Keen in order to find a solution in regard to hardening an outer surface of a U-shaped tubular profiled member. The device of Keen requires a precise fit between the tool and the bore to be treated. Moreover, the apparatus of Keen employs a rotary drive system acting on the balls arranged on the periphery of the tool,

and this can only be realized with a cylindrical shape of the tool and the object to be treated. A complex shape like a tubular profiled member with a U-shaped longitudinal center section cannot be treated with such a device.

The examiner has combined four references from very different technical fields, and this in itself is an indication that the invention as claimed is not obvious within the context of the technical subject matter the invention deals with.

Claim 2 concerns annealing at a temperature level between 920°C and 950°C above the AC3 point of the iron-iron carbide phase diagram, while Wassilew teaches stabilization annealing above the AC1 point, preferably at 950°C.

Claim 3 defines further the annealing step at a temperature of approximately 930°C. This special annealing temperature is not suggested by Wassilew.

With respect to the features of claim 4, the examiner states that according to Wassilew the tempering step is carried out above the AC1 point typically for one to two hours and that it is

within the skill of the artisan to select proper processing temperatures and/or duration so that the features of claim 4, tempering at a temperature of 280°C for approximately 20 minutes, is obvious. The AC1 point is at 723°C. The minimum duration suggested by Wassilew is 1 hour. The present invention claims a temperature of 280 °C and a duration of 20 min. - in regard to the temperature this is one third of the upper limit provided by the AC1 point and in regard to the duration the claimed value is one third of the lower limit provided by Wassilew. Therefore, the claimed ranges are certainly not within the remotely suggested ranges nor within ranges that could be determined by due experimentation. The differences are so large that the prior art does not provide any teaching or suggestion in this respect.

The examiner suggests that Keen teaches strengthening of the outer surface by impinging balls, in particular, steel balls. Keen discloses a tool for surface treatment of bores where balls provided on the tool are forced by a rotating drive against the wall of the bore. This requires a precise matching of tool and bore and makes it impossible to adapt such a tool to complex shapes such as a tubular profiled member with U-shaped central section and round ends.

None of the references concerns the heat treatment of the U-shaped tubular profiled member with a special longitudinal section. Therefore, the cited prior art Wassilew can also not suggest the features of claim 8.

Reconsideration and withdrawal of the rejection of claims 9 and 11-13 under 35 U.S.C. 103(a) as being unpatentable over Toepker et al. (EP 0752332 A1) in view of Wassilew et al. (EP 0 306 609) and Wardwell et al. (US 3,769,103) and Keen (US 3,934,443) is respectfully requested.

In regard to claim 9 it is, in applicant's opinion, not obvious to combine the four cited references which all refer to a different technical field in order to arrive at a twist beam rear axle. There is no incentive for a person skilled in the art of twist beam rear axles to look into the field of manufacture of the semi-finished or end product of a single-phase, high alloy martensitic chromium steel (Wassilew) with the special configuration of a threaded section of a thread-forming device (Wardwell et al.) and finally the teaching of a tool for the treatment of the surface of bores (Keen). The examiner appears to apply the cited references in hindsight. No person skilled in

the art facing the object of the present invention would look into the technical fields suggested by the examiner in order to find a solution to the stated problem.

The same holds true for the features of claim 11. A person skilled in the art of twist beam axles would not consider the field of thread/thread-forming devices in order to find suggestions for the treatment of U-shaped tubular profiled members for the manufacture of a twisted beam rear axle.

In regard to claims 12 and 13 reference is being had to the discussion above. Applicant would like to underscore again that Keen is not suitable for the treatment of complex structures.

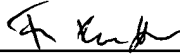
The claims 1-13 are therefore not obvious in view of the cited prior art and should be allowable.

Applicant would like to further point out that the basic German application upon which the instant U.S. application is based has passed to issue in the German Patent and Trademark Office without an office action and without an opposition having been filed.

Therefore, in view of the foregoing, it is submitted that this application is now in condition for allowance and such allowance is respectfully solicited.

Any additional fees or charges required at this time in connection with the application may be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,

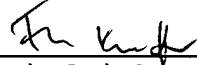


Friedrich Kueffner
Reg. No. 29,482
342 Madison Avenue
Suite 1921
New York, N.Y. 10173
(212) 986-3114

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on June 21, 2001.

By: 

Friedrich Kueffner

Date: June 21, 2001